UC Research Cyber-infrastructure: The Business Case for a Pilot

1. The urgency of creating a world-class UC Research Cyberinfrastructure\(^1\) (CI) is reflected in a rapidly escalating need for compute capability to do competitive research and the corresponding substantial rise in energy costs and space needs associated with these resources.
   a. UC growth in research compute resources is projected at 30% per year and in aggregate is comparable to a large supercomputer center.
   b. Increased energy costs will exceed $15 million annually if not addressed with more efficient data centers and better use of compute and storage processors.
   c. Data center space is driven by research. Five UC campuses will hit a crisis point in the next two years.

2. In the absence of action on shared UC research computing facilities, a proliferation of distributed computer cluster systems throughout the campuses in sub-optimal, remodeled locations will continue. The consequences are:
   a. Resources are not leveraged with each other to generate needed research capability and are often underutilized if we continue with “business as usual”.
   b. This practice is extremely costly in terms of facilities, power, cooling, and space, costing 3 to 4 times more than efficient data center space.
   c. UC will not be competitive.

3. Peer institution CI investments are in the range of $5 - $15 million and are adversely impacting the competitiveness of our campuses.

4. Success of a > $200 million UC Data Center initiative on the UC Business Efficiencies agenda is dependent on the success of the UC CI initiative to accommodate research needs. By consolidating compute and data center resources through the leveraged use of existing computing resources at LBNL and SDSC, UC can provide greater research capability and at the same time significantly lower facility costs.

5. The UC VCRs and the UC CIOs support a $5M UC Research CI initiative with $1.5M annual recurring costs to pilot Northern and Southern California shared compute and storage resources accessible through the UC Research Grid.
   a. The goal is to position UC and its individual campuses for significant grant funding in CI-enabled research by learning how to share compute and storage resources in shared data centers.

\( ^{1} \) CI is the coordinated integration of a diversity of hardware, software and human resources that includes network (campus, system, state and national), computational clusters, collaborative clusters, shared storage systems, co-location facilities, collaboration / virtualization tools, system administration support, code librarians, coding experts, grid access tools, visualization tools and resources and licensed software.
b. Northern and Southern California facilities, at LBNL and SDSC respectively, will prototype how to use many other UC CI compute and data storage resources on a UC research grid.

c. The Pilot will demonstrate how to focus on-campus research network investments and will provide necessary investment to bring all campuses to have access to resources.

d. The Pilot will have a clear plan for assessment and evaluation. Lessons learned will help with planning a UC-wide research computing environment that ties together resources from all campuses.

6. The Pilot will have a transparent, agile governance process that involves faculty, CIOs, and VCRs. The project has conceptualized a Cyberinfrastructure Governance Council (CGC) that will provide faculty and administrative input into investments that UC is considering making to support development of a world-class UC research cyberinfrastructure (CI). The CGC will work closely with UC VCRs and CIOs. Guidance to be sought from the CGC during the initial phase of launching pilot projects will include determining how best to allocate resources, ensure broad participation, and evaluate the success of the pilot projects. The CGC will also advise on future UC investments for advancing research CI.

7. The CI pilot began with a call for proposals through the VCRs for computationally-intensive projects that would 1) advance UC research in priority areas, such as global health and environmental science; 2) make the projects more competitive for obtaining extramural support; and 3) nucleate new communities of cyber-enabled researchers in areas like the social sciences, arts, and humanities. Over 30 proposals were received from almost all campuses and national laboratories, indicating strong faculty interest and need.

The Pilot and in particular the storage and database resources will coordinate with data storage initiatives and is expected to be of interest to the UC Humanities Research Institute and the UC Berkeley Bamboo Project.

8. UC has the potential and is on a track to be among the institutional leaders across the country in research CI and competitiveness for CI-enabled research funding.

9. UC has developed leadership-class grid technologies that provide access to remote compute facilities and also has nationally recognized research computing facilities and expertise at the Lawrence Berkeley Laboratory and the San Diego Supercomputer Center.